

designing small probes, plus some features which were added as a result of our latest design efforts.

- Newly-designed thermoplastic tip for increased moisture resistance.
- Our patented Tip Loc™ molding method keeps the probe tip from twisting and vibrating loose.
- Our patented Cable Loc™ design provides 34 kg (75 pounds) of pull strength between the probe cable and case.
- Stainless steel probe case and connectors provide superior strength and corrosion resistance.
- Stainless steel armor available for probe and extension cable.
- High pressure feedthrough available for a cable seal option on pressurized machines.

Proximity transducers are the heart of the machinery monitoring system. They have to be durable because they measure rotor motion inside the machine where extreme temperatures, pressures, pH, and vibration can reside. Proximity transducers must also be accurate and reliable because the entire machine protection and management system depends on their signals.

XY vibration measurements

XY radial vibration measurements are the standard for monitoring journal bearing machines. Anything less precludes adequate protection and diagnostic capabilities. A minimum shaft diameter of 51 mm (2 inches) is necessary when using two 3300, 5 mm Probes in an XY configuration.

Quality design

The 3300, 5 mm Proximity Probe is designed to work in most rotating and reciprocating machinery applications. The service life of the probe is virtually unlimited since it does not make contact with the rotating shaft and has no moving parts to wear out or degrade. Field-proven components, high accuracy and a quality design make up the 3300, 5 mm Proximity Probe. These features will provide reliable service and added value for the years ahead. Contact your nearest Bently Nevada sales representative for more information. ■

Important names in Rotor Dynamics

Aurel Stodola pioneered early turbine and compressor design

Aurel Stodola, 1859-1942, was born in Liptovsky Mikulas, Slovak Republic, which was part of the Austro-Hungarian Empire at the time. He was a contemporary of Albert Einstein and was one of the world's major rotordynamicists, according to Don Bently, "because he took the time and effort to put together a compendium, a bible, of steam and gas turbines." Don Bently thinks that work, a two-volume set published in 1924, is "still important today, due, at least, to the historical perspective it provides of a golden age when things were first being learned and done."

Stodola could be considered the first Control Engineer. He carried out fundamental work in turbine and compressor design and was instrumental in having a mathematician colleague formulate a stability criterion for turbine control. He introduced the use of time constants and dimensionless numbers to modeling that not only helped one manipulate equations, but also immediately interpret them in a physically meaningful way. Dimensionless numbers detached the system characteristics from the details of the physical construction of the machin-

ery, a major step in the development of the systems approach.

From 1892 until his retirement in 1929, Stodola was Professor of Mechanical Engineering at the Polytechnikum in Zurich, which later became the Swiss Federal Institute of Technology. He was also a much sought after industrial consultant. His turbine engineering consulting group was an important factor in establishing Switzerland as a major manufacturer of steam and gas turbines.

Not content to rest upon his laurels after his retirement, Stodola wrestled with the engineer's place in society and the new physics. He maintained in his book, *Philosophy of an Engineer*, that engineers have a responsibility to take part fully in the public, intellectual, and cultural life of the community, to not be seduced by the magic of technology to the exclusion of everything else. He even gave a creditable account of relativity and quantum theory with some help from Einstein, who had been a colleague of his for a short time at the Institute. ■

References:

Bissell, C., "Control engineer and much more: aspects of the work of Aurel Stodola," *Measurement and Control*, Vol. 22, May 1989, pp. 117-122.



Technical Training



Attendees of the Bently Rotor Dynamics Research Corporation Advanced Machinery Dynamics Course held in Singapore during October 1996. Donald Bently, Dr. Agnes Muszynska, Don Silcock and Rett Jesse presented topics at the course.